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FEBRUARY 1959

The Forest Insect and Disease Situation

Lake States 1958

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DONALD C. SCHMIEGE

FOREWORD

Forest insects and diseases are ever-present threats to Lake States timber resources. Past losses in tree growth and mortality are indicative of how destructive such pests have been and may continue to be in the years ahead. To appraise adequately the regionwide insect and disease situation, the Lake States Forest Experiment Station summarizes each year the information on the current status of insect infestations and disease infections.

To prepare such a report it is essential that use be made of all available information. Many individuals, State organizations, and forest industries have been helpful. Their active and willing cooperation is gratefully acknowledged. Special acknowledgment is made of the information and help given by the following.

Michigan:

Division of Forestry, Conservation Department
Bureau of Plant Industry, Department of Agriculture
University of Michigan
Michigan State University

Minnesota:

Division of Forestry, Conservation Department
Office of State Entomologist, Department of Agriculture
University of Minnesota

Wisconsin:

Forest Management Division, Conservation Department
Office of State Entomologist, Department of Agriculture
University of Wisconsin

Copies of the report may be obtained from the Lake States Station, who collected some of the original material, summarized all information, and processed the report.

Cover picture: A large sugar maple killed by maple blight, Florence County, Wis.

THE FOREST INSECT AND DISEASE SITUATION

LAKE STATES, 1958

Gerald W. Anderson
and
Donald C. Schmiege

Station Paper No. 70
February 1959

Lake States Forest Experiment Station
Forest Service, U. S. Department of Agriculture
St. Paul 1, Minnesota

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CONTENTS

Page

FOREWORD.. inside front cover

INTRODUCTION.. 1

HIGHLIGHTS FOR 1958.. 1

Insects.. 1
  Some important plantation insects.. 1
  Some major insects in natural stands.. 2

Diseases.. 2
  Two new diseases noted in 1958.. 3
  Changes in distribution and severity noted for some diseases.. 3
  The status of some other diseases merits mention.............. 4

THE MOST IMPORTANT FOREST INSECTS IN 1958.. 4

  Spruce budworm--outbreak expanding.. 4
  Jack-pine budworm--general decline.. 5
  European pine shoot moth--control remains difficult.......... 5
  Saratoga spittlebug--new areas found.. 6
  White-pine weevil--damage increasing.. 6
  Larch sawfly--outbreak unchanged.. 7
  Pine sawflies--control necessary.. 7
  Pine root collar weevil--a serious pest.. 8
  Tent caterpillars--populations increasing.. 8
  Poplar borers--cause volume loss.. 9
  Miscellaneous hardwood defoliators--little damage noted....... 10
  Gypsy moth--infestation still present.. 10

THE MOST IMPORTANT FOREST DISEASE DEVELOPMENTS IN 1958.............. 11

  Nursery root rots also damaging red pine.. 11
  New canker disease of jack pine identified.. 12
  Concern still high over maple blight.. 12
  Maple dieback has increased.. 14
  Jack pine-comandra rust also found in Michigan............... 14
  Controls of Dutch elm disease in operation.. 15
  Boxelder blight less severe.. 16
  No new needle droop damage observed.. 16
  Oak wilt continues to take annual toll.. 16
  Comprehensive analysis of Hypoxylon data undertaken.......... 17
  Research indicates need for more Ribes eradication in swamps.. 18

THE FOREST INSECT AND DISEASE SITUATION

LAKE STATES, 1958

by

Gerald W. Anderson and Donald C. Schmiege[1]

INTRODUCTION

Insects and diseases play an important part in the reduction of our vast forest resource. Each year they cause large losses in timber growth and result in tree mortality. But that is not all: These agents attack the forest from seed to finished product. Stocking levels are lowered, growth is retarded, and trees are deformed, thus reducing both quality and quantity of forest products. The protection of our forests against these destructive agents is the responsibility of everyone concerned with the national economy.

This report summarizes the information collected by many agencies and individuals on the forest insect and disease situation during 1958 in the Lake States. The most important aspects are presented briefly in the next few pages. For more detailed discussion see sections on The Most Important Forest Insects (or Diseases).

HIGHLIGHTS FOR 1958

Insects

Some Important Plantation Insects

Several destructive insect pests are a constant threat to the establishment and maintenance of conifers. In the Lake States region roughly 2 million acres of valuable coniferous plantations must be protected from damaging infestations. The major plantation insect pests in the Lake States in 1958 are listed below:

1. The Saratoga spittlebug on red and jack pines: Although control operations during 1958 covered a somewhat smaller acreage than the average

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[1] Forest Pathologist and Forest Entomologist respectively, Lake States Forest Experiment Station. The Station is maintained at St. Paul 1, Minn., by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of Minnesota.

for the past 10 years, the spittlebug poses a constant threat to thousands of acres of red pine in northern Wisconsin and Michigan.

2. The European pine shoot moth: This insect is now widely distributed in Michigan and southeastern Wisconsin and has caused severe damage in many plantations and ornamental plantings.

3. The white-pine weevil killed the terminals of various pines, noticeably white and jack, and Norway spruce throughout the Lake States. Injury to red pine is becoming more common.

4. The red-headed pine sawfly is apparently on the increase in portions of Wisconsin and Michigan. This insect is a constant threat to red and jack pines.

5. The pine root collar weevil and various species of sawflies were reported in damaging abundance from numerous localities.

Some Major Insects in Natural Stands

Four species of defoliators, primarily pests of natural stands, were also of importance in 1958.

1. The spruce budworm: This destructive defoliator of mature spruce-fir type has caused moderate to heavy defoliation since 1954 on nearly a million acres in Minnesota.

2. The larch sawfly: The outbreak has been in progress for about 10 years, and widespread defoliation and loss of growth is being sustained. Scattered areas of dead trees are also evident.

3. The forest tent caterpillar: This pest again maintained outbreak populations in one area in Minnesota and scattered areas in northern Wisconsin.

4. The jack-pine budworm: Populations generally declined throughout the Lake States. Several thousand acres of jack pine within the Superior National Forest were moderately to heavily defoliated.

Diseases

The forest disease situation, unlike that of forest insects, does not as a rule change rapidly from year to year. The overall disease situation in the region was described in the 1956 report.[2] In the present report, as in that for 1957, attention is limited to marked changes in prevalence of diseases and to new diseases that attracted attention during the year.

Two New Diseases Noted in 1958

Red pine root rot appeared in one of the three nurseries that suffered from black spruce root rot in 1957. A 50-percent loss occurred in one compartment as a result of this disease.

Stalactiforme-type cankers were found on pole-sized jack pine in two areas of Minnesota. This disease, common in the West, has not been previously reported in this region.

Changes in Distribution and Severity Noted for Some Diseases

While maple blight was found in one new area, it did not intensify in 1958 as much as had been feared. Studies are being conducted on various aspects of this problem.

Maple dieback is distributed throughout the region, with some mortality occurring. This condition seems to be intensifying.

Comandra rust cankers, previously reported in Minnesota, have now been found in Michigan. They are not abundant enough to create a management problem at this time.

Dutch elm disease controls are continuing in both Michigan and Wisconsin. Thus far the disease has not been found in Minnesota.

Boxelder blight was not a serious problem in North Dakota this year. Weather conditions may be responsible for limiting its activity.

No new needle droop damage was observed in the areas that had suffered heavily during 1956 and 1957. Most of the damaged trees are recovering but have lost 2 or 3 years' growth.

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[2] Beckwith, L. C., and Anderson, R. L. 1956. The forest insect and disease situation, Lake States, 1956. U. S. Forest Serv., Lake States Forest Expt. Sta., Sta. Paper 42, 26 pp., illus.

The Status of Some Other Diseases Merits Mention

Oak wilt infection centers in Wisconsin and Minnesota were becoming established more rapidly than in the years 1955-57. In Michigan oak wilt control measures are employed, and thus far the results are encouraging.

Hypoxylon cankers were more prevalent, but mortality of attacked aspen trees remained about the same. Plans have been made to analyze all available Hypoxylon data with the aid of electronic data computing machines.

White pine blister rust controls may have to be modified to protect pine growing near swampy areas. This is based on recent work showing that air currents can carry rust spores from these swamps to pine that was formerly thought to be safe from this source of infection.

THE MOST IMPORTANT FOREST INSECTS IN 1958

The status of the major forest insect pests in the Lake States during the past year is outlined in the following pages. The more important species are dealt with in some detail while those of less importance are mentioned only briefly.

Spruce Budworm--Outbreak Expanding

During 1958 populations of the spruce budworm (Choristoneura fumiferana) increased substantially in Minnesota. Approximately 960,000 acres of spruce-fir type were moderately to severely defoliated, an increase of 31 percent over 1957. The defoliated area increase from 1955 to 1958 is depicted in figure 1. Scattered areas along the Canadian border, where severe defoliation has taken place since 1955, now appear gray from the air, and mortality can be expected as the outbreak continues.

Wisconsin and Michigan reported the insect present in some of the northern spruce-fir stands, but populations remained light.

Approximately 12,000 acres of Federal, State, and privately owned spruce-fir type on the Kabetogama Peninsula were sprayed in June. Postcontrol surveys showed that satisfactory control had been obtained; defoliation and egg masses were substantially reduced, compared with adjacent untreated stands.

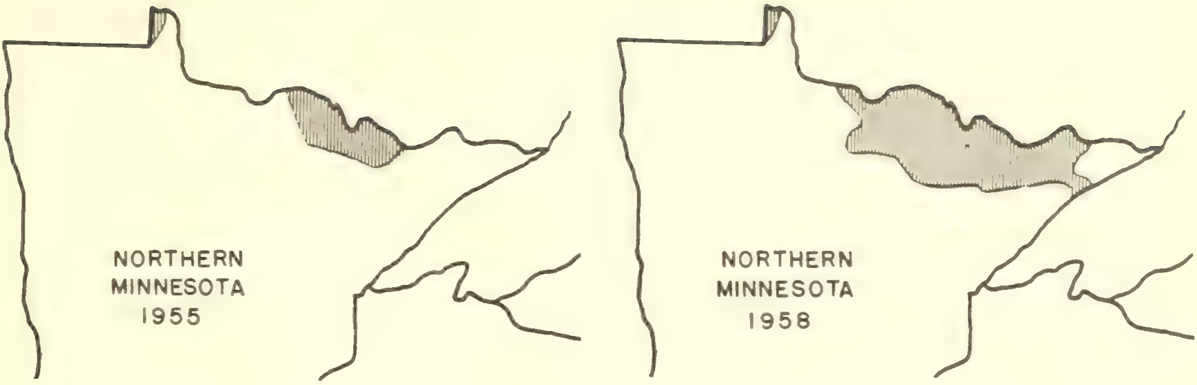

Figure 1.--Comparison of area of heavy defoliation by the spruce budworm in 1955 and 1958.

Jack-Pine Budworm--General Decline

The jack-pine budworm (*Choristoneura pinus*) populations were generally light throughout the Lake States in 1958. Moderate defoliation was noted in localized areas in Michigan's Lower Peninsula, but the overall infestation declined greatly from the previous year.

Extremely light populations were found in northwestern Wisconsin where an outbreak had occurred in 1956 and 1957. Moderate to heavy early larval populations were detected, but cold, wet weather delayed insect activity and many of the larvae failed to mature. Surveys revealed few egg masses and little noticeable defoliation.

One area near Cass Lake, Minn., was noticeably defoliated during 1958, but egg surveys indicate no large buildup. A rather extensive area of nearly pure jack pine was noticeably defoliated in the vicinity of Big Moose Lake northeast of Ely. Most of the area is within the Little Indian Sioux Roadless Area.

European Pine Shoot Moth--Control Remains Difficult

The European pine shoot moth (*Rhyacionia buoliana*) remains one of the most serious pests of red and Scotch pines in Michigan and Wisconsin. An important European parasite, *Orgilus obscurator*, has been collected in the eastern part of Lower Michigan. This parasite, which offers possibilities for natural control of the shoot moth, has been released over a period of years in Ontario, the nearest point of release being about 45 miles east of the collection locality in Michigan.

A mist-blower operation, using a 2½-percent DDT concentration, was used satisfactorily on approximately 200 acres of red pine plantations on the Lower Michigan National Forest. Late-spring hand clipping of infested buds was carried out as a control measure by Michigan State agencies on 162 acres of red pine on the Fife Lake State Forest. Methyl bromide fumigation of all stock where this insect was found was also carried out by the Michigan authorities.

Despite intensive research studies conducted in this country and Canada, effective control of the European pine shoot moth remains very difficult. Meanwhile, insecticidal, biological, and silvicultural investigations continue to shed light on the problem.

Saratoga Spittlebug--
New Areas Found

The Saratoga spittlebug (Aphrophora saratogensis) continued as a serious pest in red pine plantations in northern Wisconsin and the Upper Peninsula of Michigan. Surveys and reports during the past season indicate that some plantations in Lower Michigan also contain damaging populations.

Aerial spraying was conducted on 3,804 acres of Federal land during 1958. Control had been originally proposed on nearly 8,000 acres, but June nymphal surveys indicated great population drops in some areas. Late spring frosts occurred in the northern districts, and possibly this caused the reductions.

More than 30,000 acres of red pine plantations were surveyed in the spring by Wisconsin Conservation Department entomologists. Nymphal counts showed a need for control, and aerial treatment was carried out on 1,271 acres of State, county, and private lands located in six counties.

Adult sweep surveys on Federal lands reveal that control may be necessary on about 3,300 acres in 1959. Nymphal checks will be made in late spring to determine exact control needs.

White-Pine Weevil--
Damage Increasing

The white-pine weevil (Pissodes strobi) is a very serious pest of pine and Norway spruce stands. Although this insect does not normally cause mortality, growth loss and reduction in tree quality due to deformity are frequently underestimated.

Infestations were reported to be noticeably heavier in northwestern Wisconsin where 10 percent or more of the trees in most white pine and jack pine plantations have been attacked. Infestations of 15 to 20 percent were reported on red pine in Vilas County, Wis., where some control work was done.

Insecticidal treatment with a lindane-aroclor mixture was used by the State of Michigan and the U. S. Forest Service. Control was very satisfactory in all cases reported.

The weevil population continued to increase throughout much of Michigan's Lower Peninsula, where weeviling of over 40 percent was reported in some jack pine plantations. On some trees several laterals as well as the terminal shoot were infested.

This insect is virtually absent from the extreme southern portion of the Lake States.

Larch Sawfly--
Outbreak Unchanged

The larch sawfly (Pristiphora erichsonii) continued to defoliate most tamarack stands throughout the Lake States. An aerial survey in Minnesota showed that the area of defoliation had increased over that of 1957.

Some tamarack mortality was reported in Michigan; it had also previously been reported in Minnesota. Mortality can be expected to increase as the outbreak continues.

Wisconsin reported severe defoliation in the northern portion of the State with marked trees in some stands showing complete stripping for 3 consecutive years.

Pine Sawflies--
Control Necessary

Defoliation by a number of species of pine sawflies was reported from numerous localities throughout the Lake States region. Based on surveys by the State of Michigan, 1,090 acres of plantations were treated to control the red-headed pine sawfly. Treatment of 58 acres of Federal plantations in Upper Michigan and northeastern Wisconsin was carried out in conjunction with aerial control operations against the Saratoga spittlebug. The State of Wisconsin carried out control measures against this sawfly in the northern part of the State. The European pine sawfly defoliated hard pines in Lower Michigan, and the jack-pine sawfly and red-pine sawfly caused defoliation in "scattered" localities in Wisconsin and Michigan. The introduced pine sawfly caused heavy defoliation on white pine in Crow Wing and Morrison Counties in Minnesota and was also widely distributed in northwestern Wisconsin. It was first detected in Michigan in 1957 and was reported again in 1958.

Pine Root Collar Weevil-- A Serious Pest

The pine root collar weevil (*Hylobius radicis*) has become one of the most serious threats to jack pine and to a lesser extent red pine plantations in northwestern Wisconsin. Tree mortality continued in central Wisconsin counties too.

Some roadside plantings in central and west central Michigan continue to be attacked. Similar areas and scattered plantations on sandy areas in Minnesota were attacked, and some mortality resulted. Control remains difficult and expensive. Often serious attacks are not detected in time for control to be effective.

Tent Caterpillars-- Populations Increasing

The forest tent caterpillar (*Malacosoma disstria*) caused complete defoliation on 185,000 acres of aspen type north of Duluth, Minn., and feeding was noticeable on an additional 625,000 acres. A large acreage of defoliation is predicted for 1959. Parasitism by the fly (*Sarcophaga aldrichi*) was only 54.2 percent, a low figure after 3 years of heavy feeding. Heavy to complete defoliation of aspen stands was reported in northern Wisconsin; however, pupal parasitism as high as 95 percent was reported in some stands. For the first time since 1950, Michigan reported no defoliation. This insect, in conjunction with the Great Basin tent caterpillar (*M. fragilis*) defoliated about 3,000 acres of oak, basswood, and brush on the Sullys Hill Game Refuge and the Fort Totten Indian Reservation, Devils Lake, N. Dak. Spraying of roadside stands and picnic areas is proposed for 1959.

What is believed to be the Great Basin tent caterpillar caused some defoliation of brush species in May on the Theodore Roosevelt National Memorial Park in western North Dakota. Defoliation was also reported in late July and August, possibly by the fall webworm. Control was carried out in both cases, and additional treatment may be necessary in 1959.

Poplar Borers--Cause Volume Loss

The poplar borer (Saperda calcarata) was present to some extent in most aspen stands throughout the Lake States. The deep tunneling habits of the larvae weaken the trees structurally, allowing considerable breakage by the wind (fig. 2). Stains associated with the tunnels also necessitate culling of pulp sticks and match bolts.

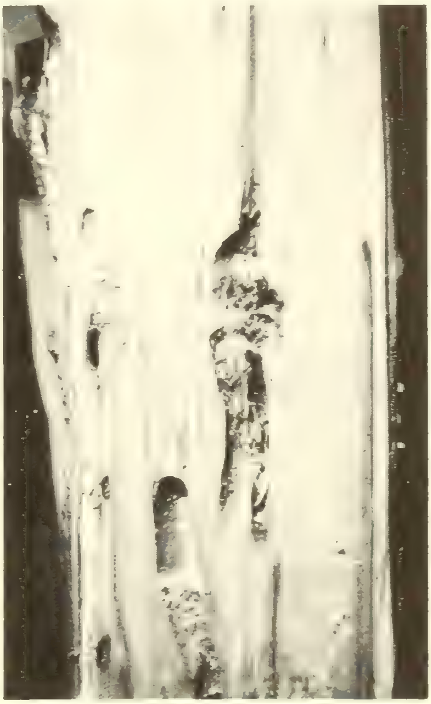

Figure 2.--An aspen bolt 5 inches in diameter showing a larval feeding tunnel (middle of bolt) and pupal cell (lower left) of the poplar borer.

Table 1, based on a series of 1/10-acre plots established at random in aspen stands in Upper Michigan, Wisconsin, and Minnesota during 1949 and 1950, shows the various levels of poplar borer attack. As far as is known, the degree of infestation by this insect does not vary greatly from year to year.

Table 1.--Intensity of attack in aspen stands, 20-40 years old, in the Lake States

Percent of trees attacked	Percent of total plots in State		
	Minnesota	Wisconsin	Upper Michigan
0- 5.0	77	51	57
5.1- 10.0	14	25	21
10.1- 20.0	5	10	14
20.1- 50.0	4	10	5
50.1-100.0	0	4	3
Total	100	100	100

Miscellaneous Hardwood Defoliators-- Little Damage Noted

The red-humped oakworm (Symnerista albicosta) defoliated 20,940 acres of oak in Michigan's Lower Peninsula. Most of the area defoliated in 1957 was not stripped again this year. The insect creates little serious damage but is an annoyance to residents in the area.

The large aspen tortrix (Archips conflictana) caused scattered defoliation throughout much of the Upper Peninsula of Michigan, consuming up to 75 percent of the leaves in some areas.

Fruit tree leaf roller (Archips argyrospila) populations in Michigan were drastically reduced by parasites and late spring frosts. Very little defoliation was noted.

A survey using black light traps was made in Florence County, Wis., to determine the species of insects associated with dead and dying maples. The webworm previously reported was identified as Tetralopha asperatella and the leaf rollers as Sparganothis acerivorana and Acleris chalybeana. The study was conducted by University of Wisconsin and Wisconsin Conservation Department personnel.

Gypsy Moth-- Infestation Still Present

The following information on the gypsy moth was received from the Division of Plant Industry, Michigan Department of Agriculture, and is a summary of their work on the gypsy moth during 1958.

"The 1957 trapping program in Michigan did not result in any male moth recoveries and therefore there was no aerial spray program conducted in the spring of this year. All spraying is based on the trapping results of the preceding summer.

"Starting in June of this year, 15 seasonal trap tenders were employed to conduct the trapping phase of this program. The 1958 trapping program embraced an area of 1,499 square miles in the following central Michigan counties: Calhoun, Clinton, Eaton, Ingham, Ionia, Jackson, and Shiawassee. The seasonal employees set a total of 3,954 traps in 1,499 square miles surveyed. These traps were checked every 7 to 10 days throughout the season.

"Fifteen moths were caught in 7 traps, and all were taken between July 31 and August 25, with the highest number appearing in traps the week of August 10-16 when 9 were caught.

"The moth finds represent two widely separated areas that are to be aerially treated in the spring of 1959. These two areas are 21 miles apart. Only one of the moths trapped this season came out of a previously sprayed area. All others were caught 1 to 3 miles from any treated acreage. It appears to date that approximately 20,480 acres will have to be treated in May of 1959."

THE MOST IMPORTANT FOREST DISEASE DEVELOPMENTS IN 1958

The following pages discuss briefly some of the important tree diseases in the Lake States. The discussion is limited to new diseases and those for which new and significant information was obtained.

Nursery Root Rots Also Damaging Red Pine

During the year, 50 percent of the red pine on one compartment of a nursery in this region were killed by a root rot. Some losses also occurred in other parts of the same nursery. This nursery is one of three which suffered heavy losses of black spruce due to root rot in 1957. Thus far, the red pine in the other two nurseries has not been affected (fig. 3).

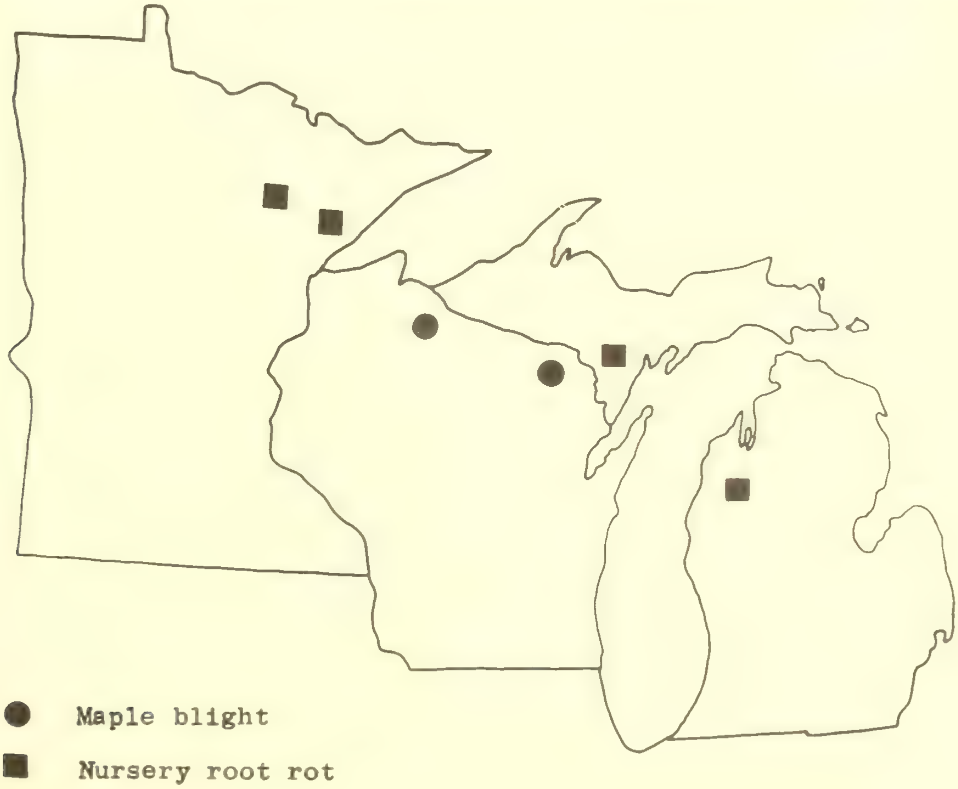

Figure 3.--Distribution of maple blight and nursery root rots in the region.

The symptoms on red pine are similar to those on black spruce in which the young trees scattered throughout the beds die during the whole course of the growing season. On neither the black spruce nor the red pine has the cause of root rot yet been learned.

During 1958 efforts were made to find a control for black spruce root rot at the U. S. Forest Service nursery near Eveleth, Minn. Seedbeds were treated with various chemical preparations prior to sowing in the spring, and periodic seedling counts were made throughout the season. Most of these tests are still inconclusive. A final evaluation will be made in 1959. Similar tests at an industrial nursery indicate that methyl bromide may be an effective control.[3]

New Canker Disease of Jack Pine Identified

Unidentified jack pine cankers occurring on the Chippewa National Forest were first reported in 1957. These cankers were found on pole-sized trees. Additional specimens have now been found near Cloquet, Minn. During 1958 further investigations showed that they are stalactiforme-type rust cankers.[4]

This rust is common on pines in the western States, but it had never been reported in Minnesota. Several species of Scrophulariaceae serve as alternate hosts for the rust.

Concern Still High Over Maple Blight

Maple blight, one of the new diseases described last year, has caused much concern among members of the hardwood industry in the region. It was first reported in Florence County, Wis., during the summer of 1957. Presently it is distributed over a gross area of approximately one township, with severe damage on about 1,000 acres. While this represents little spread during the current year, 1 new blight location, involving 2 small areas, was found in Iron County, Wis. (fig. 3). Since the cause of maple blight has not yet been determined, it is impossible to forecast the potential of this disease in these or other areas where hard maple is found.

3/ Methyl bromide is very toxic to humans and must be handled with care in accordance with directions for use.

4/ An article on the nomenclature of this rust is now being prepared by the Lake States Station.

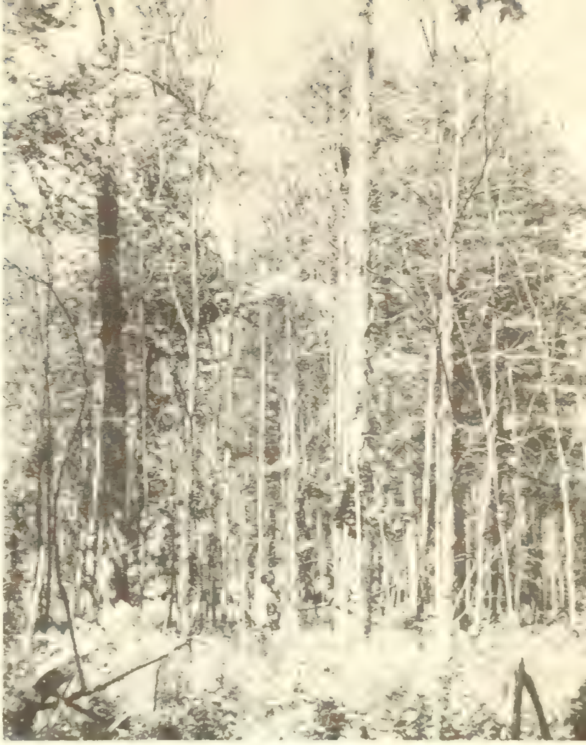

Figure 4.--Pole-sized sugar maple killed by maple blight, Florence County, Wis.

The disease is characterized by the rapid killing of hard maple trees of all sizes (fig. 4). The dead trees tend to occur in localized groups with lesser mortality in surrounding areas. This gives the stand a "patchy" appearance. Individual trees affected by blight do not exhibit any very specific symptoms. Rather, diagnosis is based on the total effect on a group of trees. In general, maple attacked by blight die rapidly--apparently within the first growing season--and the foliage drops quickly. Some of the smaller blight-killed trees have sprouts developing from the root collar, indicating that the root system is still alive. This basal sprouting has not been noted on the larger trees. Some trees have suffered serious damage without death of the entire crown. These have foliage on clumps of epicormic sprouts. Some of these trees appear to be holding their own; others are continuing to decline.

Salvage logging operations, involving about 1½ million board-feet, have been conducted within the affected areas. This serves to utilize the maple killed by the disease.

Both the Station and the University of Wisconsin are attempting to determine the cause of maple blight. One man from the Station is working on the environmental aspects. During 1958 he established 93 permanent plots in the area. Preliminary analysis of information from these plots indicates that the blight is more common in low-density pure hard maple stands.

Personnel from the University of Wisconsin are investigating the possibility that a fungus, virus, or an insect may be associated with maple blight. Fungi have been isolated from blighted trees and then artificially inoculated into healthy trees to see if blight symptoms will be produced. It is still too early to judge the results of this work.

To determine whether a virus was present, a standard technique was used. Material from blighted trees was gathered and grafted onto healthy trees. These trees are being watched for any development of blight symptoms. Final evaluation of this test is yet to be made.

The investigation of insects associated with the disease consisted, in part, of making insect collections to compare populations in healthy and diseased areas. There was severe insect defoliation in the blight area prior to the appearance of blight in 1957. It has been found that this defoliation was caused by 2 new species of leaf rollers and 1 new species of webworm. In 1958 a low-level population of these insects was found throughout Wisconsin. Life history studies show a close interrelationship between these species. Because of this relationship the simultaneous buildup of all three probably was not due to chance. These defoliators are now being carefully studied. In addition, tests have been set up to determine the influence of defoliation on hard maple.

Plans are to continue intensive study of all aspects of the maple blight problem.

Maple Dieback Has Increased

A condition known as maple dieback has been noted in Michigan and Wisconsin in previous years. At times this condition is confused with maple blight. However, dieback (characterized by the dying back of branches) is usually confined to the larger trees, whereas maple blight attacks all sizes including seedlings and saplings. Observations in the past have indicated that dieback is associated with postlogging conditions, but during recent years the same symptoms have appeared in undisturbed areas. Apparently some other factor or factors are responsible for the present situation.

During 1958 dieback seemed to be more severe than in previous years. It is now distributed throughout the region from Minnesota to Lower Michigan, and some of the more seriously affected trees have been killed. Whether dieback will continue to increase or will cause extensive tree mortality is not known.

Jack Pine-Comandra Rust Also Found in Michigan

Jack pine-comandra rust cankers were reported in Minnesota in 1957. Further investigation has shown them to be present in southern Michigan. They are not abundant enough, however, to be considered a management problem at this time.

Controls of Dutch Elm Disease in Operation

Dutch elm disease was first found in this region near Detroit, Mich., in 1950. Since then the disease has spread through southern Michigan and as far north as Bay and Muskegon Counties. The first report of Dutch elm disease in Wisconsin was received in 1956. At that time it was found in six southeastern counties. It has since spread to four additional Wisconsin counties. Although the disease has not been reported in Minnesota there is no reason to believe that it will not enter the State in the future.

Control measures to combat Dutch elm disease have been adopted in both Michigan and Wisconsin. These controls are limited to municipalities where spray and sanitation programs can be maintained. In rural areas, where the aesthetic value of elm is not as great, controls are not feasible.

In Michigan[5/] during 1958 the number of diseased trees within the control area was noticeably reduced. This was the second year during which such a trend was noted. Out of 10,440 samples submitted to the Department of Agriculture's pathological laboratory for analysis, 8,585 were found to have Dutch elm disease. The trees from which these samples were taken were condemned and ordered destroyed. So too were 5,640 dead trees and 479 elm woodpiles. This latter action was taken to lessen the hazard of bark beetle increases and further disease outbreaks. A comparison with the 1957 program shows that 1,200 more samples were submitted to the laboratory during 1958, 1,200 more diseased trees were condemned, and 1,950 fewer dead trees and 70 fewer elm woodpiles were ordered destroyed.

In Wisconsin[6/] 1,832 trees in 106 municipalities were found to be infected during 1958. Most of these trees have been removed and burned, and an effort is being made to dispose of the remainder before the bark beetles emerge in the spring. The Wisconsin counties where trees are infected and the number of trees in each are:

[5/] Reported by C. A. Boyer, Chief, Division of Plant Industry, Michigan Department of Agriculture.

[6/] Reported by E. L. Chambers, Chief, Division of Plant Industry, Wisconsin Department of Agriculture.

County	Number of trees	County	Number of trees
Dane	4	Ozaukee	4
Green	7	Racine	232
Jefferson	16	Rock	435
Kenosha	156	Walworth	240
Milwaukee	585	Waukesha	153

Boxelder Blight Less Severe

Boxelder blight, which was particularly severe in North Dakota in 1956 and 1957, was much less of a problem during 1958. "Boxelder blight" is the name given to a condition on boxelder trees characterized by curled and chlorotic foliage. Nursery trees often are stunted. Although insects have been found in association with this condition, it is not known if they are responsible for it. It has been suggested that bacteria, viruses, or fungi may be involved, or that the blight is the result of 2,4-D damage. The evidence on this is conflicting. In some way the cool, dry season this summer may account for the less severe damage in 1958.

No New Needle Droop Damage Observed

Needle droop occurred in several red pine plantations throughout the area in 1956 and 1957.[7/] The damage ranged from loss of some needles to bud mortality and even death of the tree. During 1958 this disease was not observed in the region.

Oak Wilt Continues to Take Annual Toll

While oak wilt has been present in Wisconsin and Minnesota for a number of years, it was not reported in Michigan until 1951. The disease is spreading slowly in Michigan, but in Wisconsin and Minnesota its range has become quite stable. Within its range, however, the disease continues to cause serious annual losses in the oak type.

7/ Anderson, Neil A. Needle droop of red pine. U. S. Forest Serv., Lake States Forest Expt. Sta. Tech. Note 549, 1 p. 1959. (Processed.)

Michigan has a control program designed to eliminate oak wilt from the State. This control is based on aerial and ground surveys to locate infection centers. When a center is found, the infected tree as well as those healthy trees growing within the area of the infected tree's roots are girdled with an ax and a 2,4-D ester solution is applied to the girdle. The treatment is designed to hasten death of the tree and reduce spore production. The number of new infections reported in Michigan this year was below previous years, and few cases of recurring wilt on treated areas were noted. While the results of this control program are encouraging, it is felt that 2 or 3 years must elapse before a definite trend is established.

In central Wisconsin and southeastern Minnesota new oak wilt infection centers were becoming established at a more rapid rate during 1958 than in the years 1955-57. This information is based on an annual oak wilt survey made by the Station. Of 4 areas sampled, only 1 had fewer new infections. This exception occurred in east central Minnesota. Because this area is near the northern limits of the range of the disease, the cool, dry weather this year may have affected the establishment rate.

In addition to measuring the rate of establishment of new centers, the Station's oak wilt survey is designed to measure the outward spread of the disease in existing centers. Results from this part of the survey indicated that the expansion rate of existing centers decreased in 1958. Also, the percentage of existing centers on which active wilt was occurring was below that of previous years.

Comprehensive Analysis of Hypoxylon Data Undertaken

Hypoxylon cankers were more abundant in 1958 than in either of the preceding 2 years, according to information obtained from aspen plot remeasurements. The percentage of living aspen trees infected was 2.4 percent in both 1956 and 1957, but in 1958 it was 3.2 percent on these same plots. The rate of mortality due to Hypoxylon continues to be approximately 1 to 2 percent (fig. 5).

Remeasurement of continuous forest inventory plots by industrial organizations indicates a variation in the level of infection from one area to another. This lends further support to previous data which had indicated that prevalence varies with geographic location.

The problem of minimizing losses due to Hypoxylon canker on aspen has been under investigation by the Station for some time. During that time numerous studies have been installed both by the Station and by cooperators, public and private, in the region. The underlying aim in all these

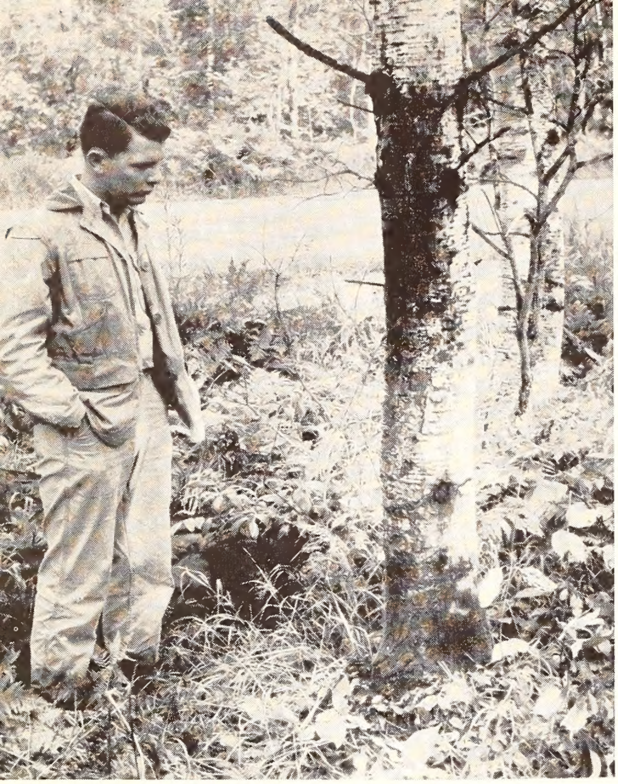

Figure 5.--Hypoxylon canker on aspen. This disease girdles and kills the tree rapidly.

studies has been to determine what factor or factors influence prevalence of the disease.

A considerable volume of data has been gathered since these Hypoxylon investigations were begun. These data have been analyzed at various times but never in an overall comprehensive manner. In an effort to evaluate all available data, a new method of analysis is being employed based on the use of electronic data processing equipment. The preliminary preparation of the data for such an analysis is quite detailed, but ultimately it will save time and expense, and it is felt that the information obtained will justify the effort. Since this project has just begun it will be some time before any results are available.

Research Indicates Need For More Ribes Eradication in Swamps

White pine blister rust control efforts are continuing in the region. Recent research results, however, indicate that these controls may have to be modified to protect pine growing near swamps. Studies show that air rising from these low areas drifts back toward higher ground and may deposit rust spores on pine which was formerly thought to be beyond the reach of the disease. For this reason it appears that Ribes must be eradicated further into these swamps in order to protect pine growing on adjoining uplands. Research is being continued to further clarify and identify situations where this hazard is present.

Research also indicates that throughout much of the southern part of the region there is little need for any blister rust control except in localized areas. These local exceptions occur where environmental conditions create a microclimate particularly favorable for the disease. By avoiding these areas it is possible to grow white pine in this southern region with little risk of loss from blister rust.

SOME RECENT STATION PAPERS

Marking Guides for Northern Hardwoods Under the Selection System, by Carl Arbogast, Jr. Sta. Paper 56, 20 pp., illus. 1957.

Managing Red Pine for Poles in Lower Michigan, by Paul C. Guilkey. Sta. Paper 57, 21 pp., illus. 1958.

Proceedings, Third Lake States Forest Tree Improvement Conference, Sept. 17, 18, 1957. Sta. Paper 58, 87 pp., illus. 1958.

Incidence of White Pine Blister Rust Infection in the Lake States, by D. B. King. Sta. Paper 64, 12 pp., illus. 1958.

Fire Fuels in Red Pine Plantations, by Loyd LaMois. Sta. Paper 68, 19 pp., illus. 1958.

Snow Behavior in Forests of Northern Minnesota and Its Management Implications, by Sidney Weitzman and Roger R. Bay. Sta. Paper 69, 18 pp., illus. 1959.

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- Red Pine, by Paul O. Rudolf. Sta. Paper 44, 32 pp., illus. 1957.
- Black Spruce, by M. L. Heinselman. Sta. Paper 45, 30 pp., illus. 1957.
- Rock Elm, by Harold F. Scholz. Sta. Paper 47, 16 pp., illus. 1957.
- Quaking Aspen, by R. O. Strothmann and Z. A. Zasada. Sta. Paper 49, 26 pp., illus. 1957.
- Sugar Maple, by R. M. Godman. Sta. Paper 50, 24 pp., illus. 1957.
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- Balsam Poplar, by Eugene I. Roe. Sta. Paper 65, 17 pp., illus. 1958.
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- Northern White-Cedar, by R. M. Godman. Sta. Paper 67, 17 pp., illus. 1958.